SUPREME COURT OF THE UNITED STATES.

No. 110.

HOGG ET AL. vs. EMERSON.

SECOND CERTIORARI AND RETURN.

UNITED STATES OF AMERICA, *ss.*

The President of the United States of America, to the honorable the judges of the circuit court of the United States, for the southern district of New York, greeting:

Whereas, in a certain suit in said district court, between John B. Emerson, plaintiff, and Peter Hogg and Cornelius H. Delamater, defendants, which suit was removed to the Supreme Court of the United States by virtue of a writ of error, agreeably to the act of Congress in such case made and provided, a diminution of the record and proceedings of said cause has been suggested, to wit:

"That several exceptions were taken at the trial which do not appear on the bill of exceptions, and which were stricken from thence by the order of the court below."

You, therefore, are hereby commanded, that, searching the records and proceedings in said cause, you certify what omissions you shall find to the said Supreme Court of the United States, so that you have the same, together with this writ, before the said Supreme Court, on the first Monday in May next.

Witness the honorable Roger B. Taney, chief justice of said Supreme Court, the first Monday of December, A. D. 1847.

WM. THOS. CARROLL,
Clerk of the Supreme Court, U. S.

The answer of the judges of the circuit court of the United States, for the southern district of New York, in the within writ mentioned:

The omissions whereof mention is within made, with all things concerning the same, are hereby respectfully certified to the Justices of the

Supreme Court of the United States within mentioned in a certain schedule to this writ annexed, as within it is commanded.

Witness the honorable Roger B. Taney, chief justice of the Supreme Court of the United States, this eighth day of January, in the year of our Lord one thousand eight hundred and fifty, and of the independence of the United States the seventy-fourth.

ALEX. GARDNER, *Clerk.*

Circuit court of the United States, for the southern district of New York, in the second circuit.

PETER HOGG and Cornelius H. Delamater ads. } JOHN B. EMERSON. }

Afterwards, to wit, at a circuit court holden at the City Hall, in the city of New York, within and for the southern district of New York aforesaid, on the first Monday of April, in the year one thousand eight hundred and forty-seven, the aforesaid issue, so joined between the parties as aforesaid, came on to be tried by a jury of the said district, for that purpose duly empannelled; at which day came there as well the said plaintiff as the said defendants, by their respective attorneys aforesaid; and the jurors of the jury aforesaid, empannelled to try the said issue, being called also came, and were then and there in due manner chosen and sworn to try the said issue; and upon the trial of that issue the counsel for the said plaintiff, to maintain and prove the said issue on his part, offered in evidence the original letters patent of the plaintiff, dated March 8th, 1834, and recorded anew, May 5th, 1841, with the schedule thereunto annexed, which being admitted, were read to the court and jury, in the words and figures following, to wit:

The United States of America, to all to whom these letters patent shall come:

Whereas, John B. Emerson, a citizen of the United States, hath alleged that he has invented a new and useful improvement in the steam engine, which improvement he states has not been known or used before his application, hath made oath that he doth verily believe that he is the true inventor or discoverer of the said improvement, hath paid into the Treasury of the United States the sum of thirty dollars, delivered a receipt for the same, and presented a petition to the Secretary of State, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose: These are, therefore, to grant, according to law, to the said John B. Emerson, his heirs, administrators, or assigns, for the term of fourteen years from the eighth day of March, one thousand eight hundred and thirty-four, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said John B.

Emerson himself, in the schedule hereto annexed, and is made a part of these presents.

In testimony whereof I have caused these letters to be made patent and the seal of the United States to be affixed. Given under my hand at the city of Washington, this eighth day of March, [L. S.] in the year of our Lord one thousand eight hundred and thirty-four, and of the independence of the United States of America the fifty-eighth.

ANDREW JACKSON.

By the President:
LOUIS MCLEAN,
Secretary of State.

CITY OF WASHINGTON, *to wit:*

I do hereby certify, that the following letters patent were delivered to me on the eighth day of March, in the year of our Lord one thousand eight hundred and thirty-four, to be examined; that I have examined the same, and find them conformable to law; and I do hereby return the same to the Secretary of State, within fifteen days from the date aforesaid, to wit, on this eighth day of March, in the year aforesaid.

B. F. BUTLER,
Attorney General of the United States.

The schedule referred to in these letters patent, and making part of the same, containing a description in the words of the said John Brown Emerson himself, of his improvement in the steam engine:

To all whom it may concern: Be it known, that I, John Brown Emerson, of the city of New York, have invented certain improvements in the steam engine, and in the mode of propelling therewith, either vessels on the water or carriages on the land, and that the following is a full and exact description thereof:

One object of my improvement is, to substitute for the crank motion a mode of converting the reciprocating motion of a piston into a continued rotary motion, by a new combination of machinery for that purpose.

This mode is applicable to an engine either with one or with two cylinders, and is carried into effect as follows: Alongside of the cylinder I place a shaft, the lower end of which may revolve in a step on the platform or foundation upon which the cylinder stands; in which case it must be somewhat longer than twice the length of the cylinder, as it must extend above it to a height somewhat greater than the length of the stroke of the piston. Sometimes, however, this shaft may have its lower gudgeon only a small distance below the upper end of the cylinder, whence it must extend above it as before. Its upper gudgeon must of course be sustained by a suitable frame. This shaft is to stand parallel to the piston rod, from which it is to receive its revolving motion. Upon the upper end of the shaft, above the top of the cylinder,

there is to be placed a solid cylinder of wood, or of any other convenient substance, of such diameter as shall cause its periphery to come nearly into contact with the piston rod for its whole length when the piston is raised. The solid cylinder above described is to be made to revolve in the following manner: I make a groove in it, which commences near its lower end, and passing spirally extends half way around it by the time it reaches nearly to the upper end, or to a distance vertically equal to the stroke of the engine; from that point it passes down around the opposite half, and returns into itself at the point of beginning. Upon the upper end of the piston, against its side, I place a friction roller, which is to work in the groove in the solid cylinder; the piston rod rising between parallel guide pieces, by which it is kept in its proper place, and its tendency to turn round by the action of the roller in the groove is checked. When the piston is down, this friction roller will stand in the V formed junction of the grooves, on the opposite *of the grooves on the opposite* side, and as it is raised it will, in its passage to the upper junction, give half a revolution by the action of the friction roller on the other portion of the groove.

When two cylinders are used, they are to be placed parallel to each other, and at such a distance apart that the pistons of each may in like manner act upon the solid cylinder; the piston of one being up when the other is down. The boiler, the steam pipe, the valves for the admission and discharge of steam, and other appendages, may be similar to some of those already in use. From the revolving shaft already described, a rotary motion may be communicated to paddle wheels, steam carriages or other objects. As it is my intention, in general, to place my cylinders and revolving shaft vertically, I communicate motion to the horizontal shaft of a paddle wheel by means of bevil geared wheels near the lower end, or at any convenient part of the shaft; and by similar gearing, carriages may be propelled upon rail or ordinary roads.

When used for steamboats, I employ an improved spiral paddle wheel, differing essentially from those which have heretofore been essayed. This spiral I make, by taking a piece of metal of such length as I intend the spiral propeller to be, and of a suitable width, say, for example, eighteen inches; this I bend along the centre so as to form two sides, say of nine inches in width, standing at right angles, or nearly so, to each other, and give to it longitudinally the spiral curvature which I wish. Of these pieces, I prepare two, three, or more, and fix them on to the outer end of the paddle shaft by means of arms of a suitable length, say of two feet more or less, in such a position that the trough form given to them longitudinally shall be effective in acting upon the water. It must be entirely under water, and operate in the direction of the boat's way; instead of metal, the spiral propeller may be formed of wood, and worked into the proper form; the shape, and not the material thereof, being the only point of importance.

Where a capstan is required as on board of a steamboat, I allow the upper end of the vertical shaft, before described, to pass through the deck of the vessel, and attach the capstan thereto, so that it may be

made to revolve by the action of the shaft, rising such rag wheels and falls to connect the shaft and the capstan, as will allow of their being conveniently engaged and disengaged.

What I claim as my invention, and for which I ask a patent, is the substituting for the crank in the reciprocating engine a grooved cylinder, operating in the manner herein before described, by means of its connection with the piston rod, together with all the variations of which this principle is susceptible; as, for example, a bar of metal may be bent in the form of a groove and attached to the revolving shaft, and friction wheels on the piston rod may embrace this on each side, producing an effect similar to that produced by the groove; I also claim the spiral propelling wheel, constructed and operating in the manner in which I have set forth, and likewise the application of the revolving vertical shaft to the turning of a capstan on the deck of a vessel, not intending in either of these parts to confine myself to precise forms or dimensions, but to vary them in such manner as experience or convenience may dictate, whilst the principle of action remains unchanged, and similar results are produced by similar means.

JOHN BROWN EMERSON.

Witnesses:
M. E. JONES,
JOS. ANDREWS.

The counsel for the plaintiff then offered in evidence the deposition of Thomas P. Jones, de bene esse and ex parte, before the Hon. William Cranch, in the city of Washington, on the 23d day of November, 1844, which deposition is in the words and figures following, to wit:

And the said Thomas P. Jones being carefully examined, and cautioned, and duly sworn to testify the whole truth, and nothing but the truth, saith that he is acquainted with the invention for an improvement in the steam engine, and the means of propelling thereby, either vessels on the water, or carriages on the land, for which the plaintiff, John B. Emerson, obtained letters patent of the United States on the 8th day of March, 1834; that plaintiff applied to deponent, who was then a patent agent, and skilled in preparing specifications and drawing for patentees; and the deponent prepared the specifications, and made the drawings for plaintiff upon which the said letters patent were granted; that said specifications and drawings, after their completion, were examined by plaintiff, and filed by deponent in the patent office, and were never in the possession of plaintiff, nor out of the possession of deponent until they were filed as aforesaid.

And this deponent further says, that by reason of his having devoted many years to the subject of mechanics and engineering, both theoretically and practically, as well as his employment as patent agent, he was at the time of the issuing of the said letters patent to plaintiff familiar with the various improvements which had been proposed in the spiral propelling wheels. That deponent has a distinct recollection of the model of the spiral propelling wheel and steam engine furnished

by the plaintiff, and from which deponent made said specification and drawings, in 1834, as aforesaid, and more particularly because deponent's memory has been refreshed by the examination of an old model in March last, which, so far as it represented the propelling wheel, deponent fully recognised as being similar to the original model from which deponent made his specification and drawings; and this deponent further says, that in the month of March last past, the said plaintiff requested deponent to examine drawings then lately deposited by said plaintiff in the patent office to restore his said patent, the said original drawings and specifications and model, upon which said letters patent were granted, having been destroyed in the burning of the Patent office in December, 1836, as deponent is informed and believes; that upon such examination deponent found said drawings so deposited by plaintiff very imperfect, and unlike the original drawings upon which the said patent was granted, except in the propelling apparatus, and even that part being very imperfect and evidently drawn by a person unacquainted with the art and practice of drawing. That plaintiff then requested deponent to prepare drawings like the original drawings made and deposited by deponent as aforesaid, which new drawings were to be deposited with the consent of the Patent office in the place of the imperfect drawings so deposited by plaintiff; and this deponent further says, that in accordance with such request he prepared new drawings, and deponent verily believes that the drawings so prepared by him, which were sworn to by the plaintiff before J. C. Down, esq., a justice of the peace in and for the county of Washington, on the 29th day of March last, and on the same day deposited in the Patent office, are a true delineation of plaintiff's said improvement, and of the original model so deposited by this deponent in the Patent office as aforesaid in 1834; and deponent says, that he is informed and believes that plaintiff upon the depositing of said new drawings neglected to withdraw said imperfect drawings, and deponent is informed and believes that the same cannot now be withdrawn by reason of certified copies of them having been taken from the Patent office.

THOS. P. JONES.

The counsel for the plaintiff then offered in evidence a certain drawing, with marginal references thereto, verified by the oath of the plaintiff, as a correct delineation of his invention, described in the schedule annexed to his said original letters patent, and filed in the Patent office on the 27th day of March, 1844, pursuant to the act of Congress of March 3d, 1837, as was alleged.

The counsel for the defendants objected to the admissibility in evidence of said drawing, on the grounds, 1st. That it was not an authenticated copy of any original. 2d. That it was not regularly filed under the statute. 3d. That one drawing having been previously sworn to as a correct delineation of plaintiff's invention, and filed by him on the 12th day of February, 1844, his rights and privileges under the statute of 1837 were exhausted, and it was not competent for him to file any

other drawing subsequent thereto; and 4th. Because the plaintiff having, on the 12th day of February, 1844, filed a drawing, then sworn to by him as a correct delineation of his invention, he was estopped from denying as against the defendants, either by filing a second drawing, or in any other manner that the said drawing of February, 1844, is a full, complete, and correct delineation of his said invention. His honor the judge then admitted said drawing and evidence, and the same was exhibited to the court and jury, and the attestation and verification were read; and a copy of the same is to be referred to, by either party, upon the argument hereof.

The counsel for the plaintiff then offered in evidence the deposition of Charles Robinson, taken de bene esse and ex parte, to the defendants, on the 17th day of September, 1844, before W. J. Vason, United States commissioner, in the city of New Orleans; which deposition was read, and is in the words and figures following, to wit:

And the said Charles Robinson being by me first carefully examined, and cautioned, and duly sworn to testify the whole truth, and nothing but the truth, did depose and say, that he resides in the city of New Orleans, in the State of Louisiana, more than one hundred miles from the city of New York; that his name is Charles Robinson; and that he is a shipwright by profession.

Witness further states, that he is well acquainted with the plaintiff, John B. Emerson, and that he has known him since the last of the year eighteen hundred and thirty-four.

Witness being shown the model of a ship with a propeller wheel, which model is connected with this deposition, sealed by me by means of a piece of red tape, for the purpose of identifying the same; and being asked by the plaintiff the following question, to wit:

Have you ever before seen the model of a ship with a propeller wheel, now shown you? And if you have, state when and where did you first see it; and when and where have you since seen it.

Answers. That he has seen the model of a ship with a propeller wheel, now shown to him before; he constructed or made said model in the year eighteen hundred and thirty-seven for the plaintiff, and under the direction and instruction of said plaintiff, who employed him to make it; he has seen the model frequently exhibited in this city in the "Merchants' Exchange," since he completed the construction of it, where it was exhibited for a year or more. It was then removed from thence to the ship-yard of the witness, where it was exposed to the view of the public, until it was sent on to the city of Washington, the last of all.

Witness constructed said model in the city of New Orleans, in witnesses ship-yard, on the opposite side of the river Mississippi, to the city of New Orleans, in the year eighteen hundred and thirty-seven, as will appear from a certificate written on the face of deck of said model, and signed by witness in the presence of E. Jane Robinson and David Foble, dated the 23d day of January, 1844.

Witness further states, that he knew that the plaintiff had obtained a patent for a steam engine, and means of propelling thereby, at the

time he constructed said model; and that witness constructed said model, under the instruction of the plaintiff, as a correct representation of the steam engine, and means of propelling thereby, described in said patent, so far as it exhibits the propeller wheel, and the mode of its operations.

Witness further states, that the model now shown to him, so far as it represents the propeller wheel, is the same now as when he constructed the same in the year eighteen hundred and thirty-seven; and that the said model has not been changed, or altered in any particular whatever, since he constructed it.

(Signed) CHARLES ROBINSON.

The counsel for the plaintiff then offered in evidence the deposition of Charles Robinson, taken de bene esse, the 27th day of March, 1846, before Edward Randolph, United States commissioner, in the city of New Orleans; which deposition was read, and is in the words and figures following, viz:

And the said Charles Robinson, being by me first carefully examined, and cautioned, and sworn to testify the whole truth, and nothing but the truth, did depose and say: "I am acquainted with the plaintiff, and have known him ever since the month of December, 1835; plaintiff was then master of the ship Henry Kneeland, when deponent first became acquainted with him; said ship was then being repaired at the ship-yard of Harrod and Hughes, in the port of New Orleans; plaintiff left this city on board of said ship, as her master, as soon as she was repaired; he returned to this city in the fall of 1836; he remained here some months, when he again departed from hence as master of the brig Coral, for some port in the Gulf of Mexico; he was absent from this city some two months, when he returned with the brig, and formed a copartnership with Harrod and Robinson, the deponent, in the shipwright business, in this city, which was carried on in the name of Harrod, Emerson & Robinson, from that time, to wit, fall of the year 1837, to some time in 1842, when said partnership was dissolved; plaintiff still continued to reside here after the dissolution of said copartnership, until the month of March, 1844, when he left here, and went to New York to reside, as deponent was informed and believes.

Deponent says that he made the wood work of the model of the ship referred to in his deposition in this case, taken on the 17th of September, 1844. He means by the wood work of the model aforesaid to say, that he constructed the model of the ship to which the propelling wheel is attached; he did not make the said wheel, nor have any thing to do with its construction or design; deponent made said model in the ship-yard of Harrod and Hughes, in this parish, deponent then being foreman in said yard; he made it in 1837; the date when it was made is written on the deck of said model; the wheel was inserted in or connected to said model at the time said model was finished; the wheel was made or constructed by the plaintiff in a room in said ship-yard, during the time the deponent was making the model of said ship; he

knows that plaintiff made said wheel with his own hands, because he saw plaintiff at work on it while making it; deponent is certain, and states positively, that the wheel which was attached to said model in September, 1844, when he last saw said model and wheel, was identically the same, without change or alteration, which was inserted in, or attached to, said model in the year 1837, when he finished said model; deponent says that no other wheel was ever inserted in, or attached to, said model while said model remained in the ship-yard of Harrod and Hughes, or in the Merchants' Exchange of this city; the plaintiff never deposited or exhibited any other model in said ship-yard or Exchange at any time since deponent knew him; but deponent saw letters patent, or a patent issued to plaintiff, previous to his acquaintance with him in the year 1835; plaintiff showed said patent to deponent soon after he became acquainted with him, and explained to deponent the principle of propelling a ship by a wheel in the stern of the ship, and engaged deponent to make the model of a ship in conformity to his plan and instructions; deponent and plaintiff frequently conversed about the plan some time—at least a year—before deponent undertook to construct said model; deponent knows that plaintiff reduced his invention to practice in the fall of 1843; in the port of New Orleans plaintiff built a boat about thirty-five feet long, and applied the propeller wheel to said boat, and succeeded in propelling or moving the boat forward at the rate of two miles per hour; the experiment was made with one small engine of but little power, and that is the reason why she was not moved with greater speed; the plaintiff intended to have applied two engines, but he could get but one at the time to make the experiment with; he knows that the wheel inserted in said boat was sufficient to propel said boat at the rate of from five to seven miles per hour, with engines of sufficient power.

The wheel attached to the model which deponent made in 1837 is the same wheel which was attached to the model when he saw said model last, in September, 1844, when he gave his deposition in this case. He cannot better describe it, as to its form, size, and appearance, than to refer to it, as its form, size, and appearance were the same then as they were when he first saw it, when finished by plaintiff. The spokes of said wheel were twisted then when finished in 1837, as they were in September, 1844, when he last saw it. Plaintiff never has inserted in, or attached to, said model any screw wheel, or other wheel, than the one inserted in, or attached to, said model when deponent saw it last September, 1844. Plaintiff claimed as his invention a wheel with twisted arms, or spokes, inserted in a shaft which runs horizontal with the keel of the vessel, passing through the stern post sufficiently for to receive the arms and buckets, as well as deponent can describe it. Deponent cannot better describe the invention claimed by plaintiff, than to refer to the model and wheel attached to it. The principle developed by the operation of the wheel in propelling a vessel forward is what plaintiff claimed as his invention. Deponent never heard, nor

does he know, that plaintiff ever claimed any other wheel than the one inserted in, or attached to, said model. Deponent never saw a model of a wheel claimed to be invented by plaintiff in which the trough was a continuous spiral. No other wheel was substituted for the one which was inserted in said model by plaintiff in 1827; if there had been any other wheel so substituted deponent would have known it, unless it was, or had been, substituted since he saw the said model in September, 1844. He knows that the wheel inserted in, or attached to, said model in September, 1844, was the same that was inserted in, or attached to, said model in 1837, from its size, form, or appearance. If it was not the same wheel, it was one constructed upon the same principle, and is [so] similar in all respects, and in all its parts, that the one could not be distinguished from the other. The spiral trough, or bucket, of plaintiff's wheel was affixed to the ends of the arms, or spokes, whether in precisely the same manner as described in his specification or not, cannot say, because he does not recollect the description in plaintiff's specification. The hoops, or rims, were intended to brace the wheel. The trough, or bucket, was affixed to the ends of the arms, or spokes, of the wheels in such a manner as to give the bucket an angle of about forty-five degrees, more or less, with the shaft.

(Signed) CHARLES ROBINSON.

The counsel for the plaintiff, upon the reading of said deposition, exhibited the model of the ship therein referred [to,] and the same may be exhibited to the court on the argument of this case by either party.

The counsel for the plaintiff then called, as a witness in his behalf—

William Serrell, who, being duly sworn, testified as follows: I am a civil and mechanical engineer. I began in my father's workshop. He was a builder; my father's brother was a shipwright; in early life I had considerable experience in ship building. (Models of Emerson's wheel and Emerson's propeller were then exhibited to witness.) The wheels now shown to me are substantially alike. I have examined the specification of Mr. John B. Emerson's patent, and have seen the drawings. Abiding by this specification, as I understand it, I should produce one or the other of the wheels. The change in the number of the parts involves no mechanical difference in the form. I could certainly construct from that specification wheels similar in principle. Taking the drawings and references, there would be no difficulty in making the wheel.

Being cross examined, he testified:

I have never made a spiral wheel; I have seen one made. I have never been called upon, as patent agent, to draw the specification of a spiral paddle wheel. I am a draughtsman. I never, to my recollection, made a draught of one. I never saw a spiral propelling wheel in action. I had occasion to take up the subject of a screw propeller upwards of three years ago. I think I first saw the spiral propeller reduced to practice in one of the vessels fitted out by Hogg & Delamater four or five years ago. I made a particular examination of it; I examined it as a person operated upon by curiosity would examine it. It was then

spoken of as Ericsson's propeller. The wheels of Emerson and Ericsson do not operate upon the principle of the screw in the sense in which the counsel puts the question; they are spiral propelling wheels. The spiral floats about the rim are segments of a screw. (A. B. M. Smith's wheel is shown to witness.) That takes a middle ground between the screw and the Ericsson propeller; it is a propeller made by twisted arms. It is a screw wheel, but not in the full sense of the term. I can make Emerson's wheel from the specification without the drawings. Perhaps it would require more study than with them. Perhaps the specification does not exactly mention the rim, or band; but taking the whole specification, and seeking what it calls for, I would have added the rim or band. The space between the extremity of the blade and the hub in Smith's wheel could not properly be characterized as an arm, or spoke. It is a modification of the common smoke jack wheel; neither the construction nor the operation of the smoke jack wheel is the same as Ericsson's or Emerson's, nor would they be the same if you were to put on a rim or band. (In answer to a question put by his honor, the judge.) Witness stated, "that the arms are not of use as a propelling power, but as supports for the spiral propellers; the larger the arms the greater the impediment; the whole object of the twist in the arms is to diminish resistance. I never saw any models of Emerson's wheels except the models now produced in court. I could make a wheel like Emerson's model from the specification, without the drawings, but not so readily as with them." The witness here took the specification and showed how he would construct the wheel, following the specification. I could now make a spiral paddle without any description; but, five years since, I would have required a specification to construct one. The paddles of Emerson's wheel, in the small model now shown me, do not all rest on arms. The common paddle wheel has a rim; I should call a wheel without a rim a wheel, for want of a better term. The space between the blades and between the spokes is the trough form, as I understand the specification.

Direct examination resumed.

The wheel of Emerson's is an improvement on the wheel of Smith.

Cross examination resumed.

If you put troughs on the end of arms, you need not have an arm for each trough, if you use a hoop or rim.

George W. Coffer was next called as a witness on the part of the plaintiff, who being sworn testified, I am a machinist and engineer, and have been so engaged from childhood; my present place of business is at the West street foundry, of which I am superintendent; I have constructed steamboat engines and boilers, and side wheels for steamboats, but no other propellers or propelling wheels; I know the spiral propeller or screw paddle wheel; know Ericsson's;

I have seen the model of the wheel claimed by Mr. Emerson; the part attached to the periphery of that wheel is the propelling surface; I see no difference between the two wheels, mechanical or otherwise; both use the thread of a screw as a propeller; the Ericsson and Emerson wheels exhibit a mechanical difference in their propelling surfaces. (A. B. M. Smith's wheel is now shown to witness.) That is a spiral propeller, not a wheel; it differs from Ericsson's by being a series of spirally curved planes, while Ericsson's has arms; carrying down the floats of Emerson's wheel to the hub, would make a wheel like No. A; one has the centre hollow, the other filled; the whole of the resisting surface of the spiral planes in No. A, are dispensed with by the arms in Emerson's; the several floats are segments of a screw; if Emerson's cylinder was solid, his wheel would be a six thread screw; the inclination of the propelling surfaces is at an angle of about 45 degrees from the centre of the shaft; the less the inclination, the more the power; the greater the angle, the less the speed; the arms should be on the angle of the propelling surface; there is a necessity for this; I conceive the two wheels are on the same principle; there is no difference between one and many rims; I could from the drawings and the specification construct the Emerson model; the trough form mentioned in the specification, is the channel way between the the two propelling surfaces. The counsel for the plaintiff being about to examine the witness further as to the identity of Emerson's and Ericsson's propellers, the counsel for the defendants here admitted, that the wheels of Emerson, as made in the drawing and marginal references, and of Ericsson's, were substantially the same.

Cross examined.

I could construct the wheel in the stem of the model ship from the drawing; the drawing itself seems to be made from the model; I should from the specification make such a wheel; the specification says nothing about a hoop or rim, but I should take the cylinder in order to form the spiral curvature; I think I should take one rim instead of three; the trough is between the arms as well as the propelling surfaces, it is a way for the water; the specification says nothing about the shape of the arms; I would not, from the specification alone, know whether the arms should be twisted; I never made a propeller; I know about the application of them personally; I don't know that I have seen Emerson's with three rims. (Witness explains the difference between an oblique and a spiral plane, and gives the latter the preference.

William Cummings was then sworn for plaintiff, and testified as follows: I am a tinsmith, and made the model now produced from three to six months ago, from the specification and drawings now exhibited to me by Mr. John B. Emerson without any other instructions. I saw no model of Emerson's wheel before making this tin model. I received no explanation from any one.

Johnson P. Kiersted was then sworn for plaintiff, and testified: I am a machinist and engineer; I am employed at the Atlantic works; I

am acquainted with the defendants; was in their employ; left them in the winter, January, 1844; they made several of the Ericsson propellers; probably a dozen before I left; I think there would be no difficulty in constructing the wheel of Mr. Emerson from the specifications and drawings.

Being cross examined, he testified: I do not think I could, from the specification alone, make precisely such a propeller as this Emerson's. It is difficult to say what a man would make from the specification alone. I think from the specification I should make the arm twisted. There is no direction as to making of the arms, but I should not make them flat or round. By trough form I understand the space for the water to pass through between the arms, as well as between the propelling surfaces. There is a trough form given to the spiral paddle. There is no trough form given to the arms. I don't think there is any advantage in the rim. I should consider the twisted spoke a decided advantage, not so much in propelling as in lessening retardation. What I hold in my hand (a piece of metal bent according to Emerson's specification) is a trough, technically speaking. I do not consider it the trough form described in the specification.

Direct examination resumed.

The mechanical difference, if these planes were straight, and placed obliquely on the wheel, would be, they would not be a spiral but a wedge.

The plaintiff's counsel here rested. Defendants' counsel objected that there was no proof of a reduction of his invention to practice by the plaintiff, and that in the absence of such proof he was not entitled to recover. Overruled by the court, and exception noted.

The counsel for the defendants then opened the case on the part of the defendants, and first read in evidence to the court and jury the deposition of Thomas P. Jones, taken de bene esse, ex parte, and without notice to the plaintiff, before Judge W. Cranch, in the city of Washington, on the 21st day of December, 1844, which deposition is in the words and figures following, to wit:

And the said Thomas P. Jones being by me first carefully examined, and cautioned, and sworn to testify the whole truth, and nothing but the truth, I propounded to him, on the part of the defendants in the above entitled action, the following interrogatories:

First. Have you already given a deposition on the part of the plaintiff in this cause, Mr. John B. Emerson?

Second. Did such deposition relate in any way to the question of interference between the patent of plaintiff for a steam engine, &c., and that of John Ericsson for his propeller?

Third. Please look upon the specification of certain letters patent granted to John B. Emerson, now shown to you, and marked exhibit A, to be annexed to your deposition, and state what you know in regard to the said specification.

Fourth. Do you remember the manner of constructing the propelling

apparatus delineated in the original drawing that belonged to said specification?

Fifth. In what manner were the trough formed spirals attached to the shaft in said original drawings?

Sixth. Do you recollect whether these trough formed spirals were attached to hoops sustained by the arms, or directly by the arms themselves?

Seventh. What is your understanding on this point, from the description given in the specification of Emerson's patent?

Eighth. Was there any hoop or ring in the original drawing or model to which you have referred?

Ninth. Were the arms, as made in the original model and represented in the drawing, twisted spirally, or how otherwise were they formed?

Tenth. Please look upon the paper writing now shewn to you, and marked exhibit B, and state what it is.

Eleventh. Could any draughtsman make the drawing from the description in John B. Emerson's specification, which you have just examined?

Twelfth. Please state in what manner and from what data the drawing, of which exhbit B is a copy, was made.

Thirteenth. Have you any recollection of a sliding frame for raising or lowering the propelling wheel in Emerson's original drawing or model?

Fourteenth. Please look upon exhibit C, and state what it is.

Fifteenth. Does it correspond with the original drawing filed by John B. Emerson in 1834?

Sixteenth. Does it correspond with the drawings filed by him, March 27, 1844?

Seventeenth. Wherein does the drawing in exhibit C differ from that in schedule B?

Eighteenth. Do these two drawings represent the same, or two distinct and different inventions?

Nineteenth. If there had been in the model first submitted to you by Mr. Emerson, for the revision or preparation of his specification, one, two, or three hoops and arms with a spiral twist, would, or would not, these peculiarities have been included by you in the specification?

Twentieth. Please look upon the paper now shewn to you, and marked exhibit D, and state what it is.

Twenty-first. Please declare whether, or not, it would be possible for a mechanic, however skilful, from the specification of John B. Emerson's patent alone, or in connection with either or both the drawings in exhibits B and C, to construct a machine substantially similar to Ericsson's propeller.

Twenty-second. Is there any novelty in the principle of Emerson's spiral propelling wheel, as described in the specification and his two drawings?

And said witness being examined by me upon the above interrogatories, in answer thereto doth depose and say as follows, to wit:

To the first he saith: I have.

To the second: That my deposition related mainly to the fact of the restoration of the drawings of plaintiff's apparatus, and not in any way to the resemblance of his propelling wheel to that of Mr. Ericsson, or of any other.

To the third: That when Mr. Emerson was about to apply, or had applied, for letters patent, which were subsequently granted to him, he requested me to make drawings of his apparatus, and to examine and correct his specification; that the drawings were made under my directions from a model in his possession; that I suggested some modifications of his specification, which he approved and adopted. The instrument was not, however, as I verily believe, originally drawn up by me. The drawing and specification, above referred to, were destroyed by fire at the time of the burning of the Patent office, in the month of December, 1836.

To the fourth: That I had scarcely any recollection of the construction of the propelling apparatus, until it was called up by the exhibition of a model in the hands of Mr. Emerson, in March, 1844, when he called on me for the purpose of having new drawings prepared. Although I had a perfect recollection of his mode of working the pistons of his steam engine, in consequence of a discussion with him respecting it in 1834, I had forgotten all the particulars respecting the construction of this propeller, as my attention was not particularly called to this part when he was about to obtain his patent.

To the fifth: That I have no certain recollection on this point, and, in fact, know nothing but what has been suggested by my recent examination of Mr. Emerson's specification.

To the sixth: That I do not.

To the seventh: That the description of the propeller is very imperfect; but the idea conveyed by it to my mind is, that his trough like spirals were placed on the ends of arms and not on a hoop. Mr. Emerson mentions the employment of two, three, or more of them, as attached to arms of suitable length. Each spiral, it would thence appear, had its appropriate arm.

To the eighth: I do not recollect that there was.

To the ninth: That I have not any distinct recollection on this point; but have no doubt, whatever, that they were straight, as, had the fact of their being twisted been mentioned to or seen by me, I should have suggested the so describing them in the specification.

To the tenth: That exhibit B is a copy of that part of the drawing of Mr. Emerson's apparatus which relates to the propeller, and which was filed by him in the Patent office on or about the 27th day of March last.

To the eleventh: I answer that he could not.

To the twelfth: That the particular form shewn in the drawing was that contained in the model referred to in my answer to the fourth interrogatory, in which model there were three hoops sustaining a number of his propelling buckets and wings. I had not any distinct recollec-

tion of the original representation of this part of the apparatus, and, of course, relied on the patentee for the necessary information.

To the thirteenth: That I have not; but this part, like the wheel itself, was supplied by the before named model produced to me by Mr. Emerson at the time of making the new drawing.

To the fourteenth: That exhibit C is a copy of a drawing of the propelling part of Mr. Emerson's apparatus, which is included in the drawing which was deposited by him in the Patent office on or about the 5th of May, 1841; and subsequently, as I am informed and believed, filed as an attested drawing under the statute.

To the fifteenth: That it does not.

To the sixteenth: I reply as to the last interrogatory.

To the seventeenth: That the propelling buckets or troughs appear in exhibit C to be continuous spirals, whilst in exhibit B they appear as short sections of spirals.

To the eighteenth: That, so far as I can judge from the imperfect sketch in exhibit C, there is a substantial difference between it and that shewn in exhibit B, although both of them are spiral propellers.

To the nineteenth: That I certainly should have suggested the necessity of describing every thing in the specification, upon which the applicant relied as making part of his invention.

To the twentieth: That I have examined exhibit D, and know it to be a copy from the drawing of Mr. Ericsson's propeller, as filed in the Patent office, and that I have had occasion to examine the specification of his patent referring to it.

To the twenty-first: I answer that it would not.

To the twenty-second: That several spiral propellers had been patented both here and in England prior to that obtained by Mr. Emerson; and that, consequently, there was not any novelty in it, considered merely as a spiral propeller.

THOS. P. JONES.

The counsel for the said defendants, further to maintain and prove the said issue on their part, offered in evidence the deposition of Charles M. Keller, taken de bene esse, before Judge William Cranch, in the city of Washington, the 30th day of December, 1844; which deposition is in the words and figures following, to wit:

The said Charles M. Keller, being first carefully examined and cautioned, and sworn to testify the whole and nothing but the truth, did depose and say as follows: I am an examiner of patents in the United States Patent office, and have held the said appointment since the 10th day of July, 1836.

The duties of the said office require me to be acquainted with the science of mechanics applied to the arts, and with the range of improvements and inventions; being required to examine all applications for patents belonging to such of the classes of inventions as are assigned to me, among which are all improvements belonging to the propulsion of vessels.

I am thirty years of age, and am a mechanical engineer by profession. Some time in the month of April last, I was officially called upon by the Commissioner of Patents to examine the letters patent granted to John B. Emerson, on the 8th March, 1834, for improvements in the steam engine, and in the mode of propelling either vessels on water or carriages on land, and the letters patent granted to John Ericsson for propelling ships, &c., on the 1st February, 1838, or thereabouts. Under the instructions of the Commissioner of Patents, I made a full examination of the inventions as patented, and am well acquainted with the same; that the said inventions, patented as above, are substantially different, and do not conflict or interfere with each other; and that the distinguishing features of the Ericsson propeller, which are the cylindrical band and twisted spokes, are not alluded to in the specifications of John B. Emerson, and form no part of his patent.

That under the instructions from the Commissioner of Patents, I prepared a report on the subject thus referred to me, and that the report now shown to me, and marked exhibit A, is a true copy of the said report. That on examination of the said report I depose that the facts therein stated are true, and that the matter therein which purports to be matter of opinion and judgment is true, to the best of my knowledge and belief. CHARLES M. KELLER.

(*Exhibit A.*)

PATENT OFFICE, *April* 16, 1844.

To the Hon. H. L. ELLSWORTH, Commissioner of Patents.

SIR: In conformity with your directions, I have examined the letters patent granted to John B. Emerson, on the 8th of March, 1834, for improvements in the steam engine, and in the mode of propelling therewith either vessels on the water or carriages on the land, and also to Captain John Ericsson, on the 1st February, 1838, for propelling vessels, and have the honor to submit the following report:

The character or principle which distinguishes the Ericsson from that large class of screw or spiral propellers, so often and under such various forms essayed at the time Fulton's efforts were crowned with success, and since changed into every imaginable form, consists in attaching the paddles to a hoop or cylindrical band connected with the shaft by means of winding arms; and this feature which alone prevents its being public property, I cannot trace in the specification appended to Mr. Emerson's patent, and upon which it must stand; but, on the contrary, he distinctly states that the paddles are attached to arms, which are not even described as winding. As the original model and drawings deposited in the Patent Office by Mr. Emerson at the time the patent was granted, were destroyed by fire, on the 15th December, 1836, he has filed two drawings accompanied by a declaration on oath, that they are true delineations of the invention described in the said letters patent, and in these drawings the paddles instead of being at-

tached directly to the arms, as described in the specification, are represented as being attached to a hoop or hoops connected with the shaft by arms as in the Ericsson propeller; but whether these arms are to be straight or winding does not appear on the face of the drawings.

The use of the hoop on which to attach the paddles, if covered by Mr. Emerson's patent, would enable him to prevent the use of Ericsson's propeller; but as there is not the least allusion to this feature in Mr. Emerson's specification, I am satisfied that he will not be sustained by any court; for, in addition to the important fact that there is no mention of this feature in the specification, the drawings now in this office were filed here long subsequent to the practical application of the propeller by Captain Ericsson. In these drawings the propeller is located in a frame between the stern-post and the rudder, as in the steamship Princeton, and it is presumed that the same location has been adopted for the other vessels in progress of construction for the Government. This location for the propeller will be of great importance should further experience establish the economy of this mode of propulsion, but as this is not described in the specification, the introduction of it in the drawings will not enable Mr. Emerson to interfere with the public use of it. All of which is respectfully submitted.

C. M. KELLER,
Examiner of Patents.

The counsel for the plaintiff then and there objected to the introduction in evidence of that portion of said deposition consisting of the report of said Charles M. Keller, as examiner of patents, made to the Commissioner of Patents by the direction of the said Commissioner. And thereupon the said circuit court rejected the said report as inadmissible; to which decision of the said court the counsel for the defendants did then and there except.

The counsel for the defendants next read in evidence to the court and jury the deposition of Arthur L. McIntire, taken de bene esse before Judge William Cranch, in the city of Washington, on the 23d day of December, 1844, which deposition is in the words and figures following, to wit:

And the said A. L. McIntire, being by me first carefully examined, and cautioned, and sworn to testify to the whole truth, and nothing but the truth, did depose and say, as follows: That he is the draughtsman of the Patent office, and all the drawings deposited from time to time in the said office are placed under his charge and custody. That he finds, by reference to the books of the Patent office, on the 5th day of May, 1841, a drawing or unattested sketch was received from John B. Emerson, of a steam engine and propelling wheel, patented on the 8th day of March, 1834. Deponent further says, that about the beginning of January, 1844, said drawing or sketch was delivered by him to a Mr. Breadlove, of New Orleans, who called for the same on behalf of the patentee, and that said sketch was subsequently returned to the office attested by the said Emerson, on the twenty-second day of Jan-

uary, 1844, and deposited anew among the records of the department on or about the 12th day of February last. He further saith, that the said John B. Emerson subsequently applied to him to deliver the said drawing to him, and he declined doing so, on the ground that it had by his attestation become a part of the record of his said patented invention, and therefore could not be withdrawn from the files of the office.

ARTHUR L. McINTIRE.

The counsel for the defendants, further to maintain the said issue on their part, read in evidence the specification of certain letters patent granted to John L. Trott, by the United States, under date of June 2d, 1818, for an "improvement in the wheel for propelling boats," which said specification is in the words and figures following, to wit:

"This improvement consists first in placing the floats on the circumference at an angle of forty-five degrees to the plane of the wheel; the usual mode being to place the floats across the wheel at right angles, or ninety degrees. The angle of forty-five degrees I consider as the best, but where a slower motion is required other angles may be adopted. I therefore claim the invention in its full extent, or from ninety degrees to ten. The second improvement consists in placing the wheel at the stern of the vessel, the frame of the wheel being at right angles to the length of the vessel, consequently the axis of the wheels parallel with the keel of the vessel."

The defendant's counsel next read in evidence, the deposition of Nathan Rice, of Boston, in the county of Suffolk, and State of Massachusetts, taken before George S. Hillard, U. S. commissioner, on the 27th day of April, 1846, which deposition is in the words and figures following, to wit:

"I am fifty-six years old; my occupation is that of a merchant; my place of business is Boston; and my place of residence is Cambridge, in the immediate vicinity of Boston. The name of my firm is 'Rice and Thaxter,' and we have done business on Long wharf, in Boston, over thirty years. I am not acquainted with any of the parties to this suit.

"I was acquainted with Capt. John S. Trott. He was an old friend of our firm. I learned from him that he was engaged in constructing a wheel to be applied to propelling boats, and as he appeared to be very sanguine in the expectation that he should produce something useful and valuable, and as he intended to apply for a patent, our firm purchased an interest of one quarter part, for which we paid him two hundred and fifty dollars. I find from our books that we paid him this sum January 31st, 1818. We took from him an obligation in return. I had not then seen the wheel, and the only time I ever did see it was when Capt. Trott had fitted it to a scow in a very rude manner, and invited my partner and myself to go in her from one of the south end wharves to South Boston. We went accordingly. I recollect that the wheel was formed very much like the wheel now produced by me to the commissioner who takes this my deposition. The floats or paddles

were placed in a similar manner. His wheel was placed over the stern of the boat, and was turned by a crank in the hands of one or two men. I had not much confidence in the utility or success of the invention, and I never saw the wheel in operation afterwards, nor do I know whether Capt. Trott applied for a patent. The whole subject passed from my mind till a year or two ago, when hearing that there was a vessel at the T wharf, in this city, fitted with what I understood to be a propeller, I went to see her, and was struck with what seemed to be a perfect resemblance to Capt. Trott's wheel, in the wheel attached to her stern. My impression is that Capt. Trott's experiment was made not many months from the date of our payment to him. The boat or scow had no name. I do not know the name of the vessel at the T wharf, above mentioned. When I saw it I remarked to my partner that here was Capt. Trott's old wheel.

"NATHAN RICE."

Defendant's counsel next called as a witness John S. Trott, who testified as follows:

I reside at Williamsburg; in 1818 I resided at Boston, Massachusetts. I invented the wheel described in the specification just read in 1818. The wheel I hold in my hand (little model called Trott's wheel) is my invention; I applied it in Boston in a vessel of 40 or 50 tons; again on the Kennebec, in a boat which carried 12 cords of wood. I applied no steam; I could drive the boat in Boston harbor 6 knots with 4 men, two at each wheel; used the wheels on the Kennebec until they were worn out. The model I sent to Washington was like this now produced to me.

Cross examined.

The wheels were made of wood, and the propellers; the buckets only worked in the water with a dip of about 14 inches; the buckets were placed diagonally. The buckets used by me were straight, and placed across the outside of the wheels obliquely. I claim nothing but what I have described in my patent. (The patent forms part of this case, and may be referred to by either party.)

George Birkbeck, jr., testified as follows:

I reside in New York, and carry on business as a practical engineer. My attention has been called to John B. Emerson's specification; I could not construct Ericsson's propeller from it. The twisted arm is not found in that specification, nor the hoop. This mode (Emerson's) has three rings and nine spokes; some straight, some twisted. The specification leads me to suppose there would be one trough for each arm, and no more; I should form the wheel from the specification, by fixing the spiral troughs it describes by arms to the outer ends of the paddle shafts; I should not be informed from the specification how to place the trough; it might be variously placed so as to propel. The trough form mentioned in the specification is the form of the paddle; it does not refer to the spaces between the paddles or arms. No-

thing is said of a sliding frame to raise the propeller out of water. No mechanical necessity exists for making the arms spiral because the bucket is spiral. I have constructed propellers myself. The distinguishing characteristics of Emerson's are the twisted arms and the short cylinder; I have sometimes made propellers with arms, sometimes without. Propellers of large size require the rim of a greater strength, but they could be got along without the rim. I could not, from Emerson's specification, derive any benefit whatever toward making Ericsson's propellers; but for the short hollow cylinder it would be necessary to have a spoke for every plane; the twist in the spoke diminished resistance; I could propel a boat by the arms alone of Ericsson's propeller. I have recently made a propeller like B. M. Smith's; I could not from Emerson's specification make his drawing.

Cross examined.

I am not in the defendant's employ; I don't know where the models were made. Emerson's specification differs from his drawing, and therefore they contradict each other; because the drawing shows a rim and twisted arm, and the specification is silent about them. I could not by the specification make Emerson's wheel; I could make Emerson's wheel from his drawing. The advantage of spiral buckets over planes placed obliquely is, because the former act on the principle of the screw, and the latter on the principle of the wedge. The mechanical is different; the results produced are the same by each, but the spirits are more efficient. The propellers of the Massachusetts and Iron Witch dispense with the rim. They were not the Ericsson propellers; their blades are like those of B. M. Smith's, running into the centre with braces between the blades.

Re-examined.

I could make Emerson's wheel from the drawing alone; but if told to follow both the drawing and the specification, it would be impossible.

Counsel for defendants then offered in evidence, and read to the court and jury, the specification of a certain patent granted by the U. S. to Benjamin M. Smith, dated November 20th, 1831, and a volume of the Franklin Journal.

Henry R. Dunham was then sworn, and testified as follows:

I am an engineer and machinist, and have been more than 20 years; my establishment is the Archimedes works, at the foot of 33d street, and at the foot of North Moore street, in this city. My attention was directed some time since to the specification of John B. Emerson; from that I could not construct a wheel like Ericsson's, or that claimed to be Mr. Emerson's; there is no reference in the specification to anything but arms, trough, and spiral curvature; the drawing is not in conformity with the specification; a draughtsman could not make the drawing from this specification. I could make wheel No. 3, being Emerson's model, from either; but it would be impossible to make a wheel from

both, and follow each of them. The trough form mentioned in the specification alludes not to the spaces between the floats, but to the bend in the metallic plates.

Cross examined.

I think I have constructed four Ericsson's propellers—two for the Washington and two for the Naugatuc.

Plaintiff's counsel here inquired of witness as to the patent fees paid to Capt. Ericsson for these propellers. Defendants' counsel objected to this evidence as irrelevant.

Cross examination of Dunham continued.

The amount paid was $120 for the Washington; I think $200 for the Naugatuc. She, I think, was about 120 tons register. I built no other wheels on Capt. Ericsson's plan; I made no arrangement with Capt. Erricsson, and had nothing to do with his patent right or fees. There is a mechanical difference between spiral buckets and plane ones. The spiral is an improvement upon the plane bucket; the principle of action is different. If directed to make a wheel which is to operate under water, the fact would suggest to him the arms should be spiral.

Direct examination resumed.

(Witness is shown B. M. Smith's drawing and a model, and reads the specification of his patent.) The wheel shown is like that specified; the spiral plates are described in the specification. I have made wheels like this; one of them is in the Princeton, and is known as Stevens' scull. The spiral of Smith's description appears in the drawing.

Joseph Belknap was sworn, and testified as follows:

I have been engineer and draughtsman since 1835, and engaged in the manufacture of steam machinery and propellers. I was at one time chief engineer of the People's line, and am now in H. R. Dunham's employment; I have examined John B. Emerson's specification and drawings. I could not, by constructing the wheel in conformity with that specification, construct one like the Emerson or Ericsson models here produced. In Emerson's specification no mention is made of twisted spokes or arms. I could not make Emerson's drawing from his specification, because it exhibits features which are not alluded to in the specification; it does not conform to the specification. To construct a machine from the specification, I should take spiral troughs like these trough models, and put them on arms.

Cross examined.

I have made the drawings of two pairs of Ericsson's propellers—those of the Washington and Naugatuc. The Legare was launched in the spring of 1844. There is a discrepancy between the specification of Mr. Emerson and his drawing; in the drawing are hoops, which

are not mentioned in the specification. Taking the two together, with directions to follow both, I could make nothing. It would be impossible to make any thing, because they contemplate entirely different machines. I could make a wheel from the drawing, or from the specification alone, but not from both together.

Barnabas H. Bartol testified as follows:

I am engineer and draughtsman, and have been since 1833; am a practical mechanic. I am familiar with Emerson's specification; Ericsson's propeller could not be constructed from it. The drawing of Emerson's patent does not conform to his specification, and could not be made from it. The reason is, that there are several parts in the drawings not mentioned in the specification; such as the rim, and the twisted spoke and sliding frame. I should say, that the person who used the term trough in the specification, used it as descriptive of an essential feature of the invention, and as a different thing from a spiral blade. The trough form is the essence of Emerson's patent, and is its only distinguishing feature; there is no trough form in Ericsson's propeller; there is no mechanical difficulty in putting spiral blades on straight arms; there is no resemblance between a machine constructed in conformity with Emerson's specification, and that known as the Ericsson propeller.

Cross examined.

From Emerson's drawing and its marginal references, I should construct such a machine as Emerson's model.

Defendant's counsel here read in evidence a portion of the specification of letters patent granted to E. P. Fitzpatrick, 23d November, 1835, and to Ebenezer Beard, 25th January, 1838, and to Isaac Perkins, dated 2d July, 1829, found in 7th volume, 2d series, of Newton's London Journal of the Arts and Sciences, and plate 9th thereto belonging; to all which, and their drawings, either party may refer on the argument of this case.

Defendant's counsel next called Thomas B. Stillman, who was sworn and testified:

I am a practical engineer and draughtsman, and am one of the proprietors of the Novelty Works in this city. I have examined Emerson's specification. I could not construct Ericsson's wheel from that specification, or any thing resembling it. As the copper model of Emerson's is constructed, there are things in it which the specification does not mention, to wit, the rim and the twisted spokes. There is no spiral trough in the Ericsson's propeller. A spiral trough and a spiral frame are two different things. From Emerson's drawings and marginal references, I could construct substantially Emerson's copper model. I should, from the specification, construct a wheel by putting spiral troughs (like the models) on arms, as to the form of which, I should be guided by circumstances. Trott's wheel, with the oblique float, operates on the same principle with the spiral float. There is a very slight difference in the construction; it might not work equally well; but there is very little difference, however. The oblique planes on the

rims operate on the same principle as the screw, and produces the same effect.

Cross examined.

I made an Ericsson propeller for the Flinda. The captain provided for the patent fee for Captain Ericsson. I knew nothing about it. (All inquiries as to the patent fee of Captain Ericsson objected to as irrelevant.) I would follow the drawing, in making a model, when it contains something not specified in the specification.

Defendant's counsel next read in evidence to the court and jury from the Digest of Patents, published by Congress in 1840, referring to pages from 219 to 225.

Defendant's counsel then read in evidence the depositions of Thomas P. Jones, taken de bene esse at Washington, before Judge William Cranch, on 30th April, 1846, in the words and figures following, to wit:

Interrogatories on the part of the defendants in the above named case, to be answered by Thomas P. Jones, of the city of Washington, in the District of Columbia:

First interrogatory. Have you already testified in this case, and for which party?

Second interrogatory. Will you please to state what you know as to the use in navigation of spiral propelling wheels, and their first introduction into this country.

Third interrogatory. Are you acquainted with the wheel known as Ericsson's propeller?

Fourth interrogatory. Are you acquainted with the specifications of a patent for a new and useful mode of propelling boats in the water by the application of sculling wheels, or screw propelling wheels, granted to Benjamin M. Smith, of Rochester, Monroe county, New York, Nov. 20th, 1829, and printed on the 311th and 312th pages of the sixth volume, new of the Journal of the Franklin Institute, published in 1830?

Fifth interrogatory. Please state what you know of the application of such wheels under water at the stern of a vessel for the purpose of propelling it.

Sixth interrogatory. What constitutes the peculiarity of Ericsson's propeller, and distinguishes it from all spiral wheels before known?

Seventh interrogatory. Is it or not, in other respects than those you have mentioned, the same in principle with other screw propelling wheels, known as early as the year 1829? And, if yea, please point them out.

Answer to the first interrogatory. I gave testimony at the instance of the defendants, replying to a number of interrogatories propounded on their behalf to be used on a former trial of the same case. I also gave testimony, at the request of the plaintiff, relating to a drawing which was prepared by me, and deposited in the Patent office by the plaintiff, when he made application for a renewal of his patent.

To the second, I answer. That I have known of plans for propelling by means of spiral propelling wheels for upwards of forty years. The first that I recollect of their introduction in this country was their employment by Col Stevens, of Hoboken, which occurred, as I believe, in the year 1804. That gentleman described them to me in the month of February, 1805, and related the results of his experiments with them.

To the third. That I am acquainted with the wheel generally known as Ericsson's propeller.

To the fourth. That I am; my attention having been especially called to it by some controversy respecting it published in my Journal.

To the fifth. That the propeller patented by Smith was similar in its construction to that described to me by Col. Stevens, as above noticed. Those used by Col. Stevens were, as he informed me, wholly submerged; they were placed in the stern of the boat. He first, according to the information given by him, used a single wheel in the middle of the stern, but afterwards employed two, side by side, revolving in reverse directions.

To the sixth. That the peculiarity in Ericsson's propeller consists in his removing in part the central portion of the propelling wheel, and placing the vanes upon a short hollow cylinder, thus retaining that portion of them that are efficient in propelling, and removing the greater part of that portion which, under the best arrangement, consumes a part of the propelling power. There are left, in Ericsson's wheel, the central portion of two or more of the vanes, to operate as arms or spokes in sustaining the hollow cylinder and its vanes, and to attach the wheel to the shaft. These arms or spokes are twisted in such a manner as to avoid, as far as possible, all actions on the water. This manner of dispensing with the central portion of the wheel, is what I view as its distinguishing feature, and *is* constituting its alleged improvement.

To the seventh. That, excepting in the particulars of the removal of the inner and central part of some of the vanes, and the employment of a hollow cylinder, as above stated, Ericsson's wheel does not differ in principle from that used by Stevens in 1804; from that described by Smith in his patent of 1829; or from several others, of which I remember to have seen models in the Patent office at a date equally early with the last.

Defendants' counsel next called James A. Stevens, who testified as follows: I heard the deposition of Dr. Jones read; the Mr. Stevens there referred to was my father; I am well acquainted with the propeller; (the plates of an old copper model are shown witness;) this is exactly like the wheel constructed by my father; the arm was flat and ran up to the blade, which had the angle and the twist; the arm ran up the blade, and there were some few inches between the blade and the nub; the spiral paddle now shown me (full size) is the wing of a wheel used by my father in a ferryboat running across the Hudson; it was employed at the stern and submerged.

Cross examined.

My father did not continue to use the propeller, because it was not well adapted to river navigation, requiring too great draught of water; in 1816 he went to Washington to endeavor to induce Government to employ his propeller in a ship of war of large size; there is no difference in principle between Smith's propeller and my father's; they are the same in principle.

James Cunningham testified as follows: Emerson's drawing does not conform to his specification, and could not be made from it; with regard to the discrepancies between Emerson's drawing and specification, and to the impossibility of making an Ericsson propeller from Emerson's specification, this witness testified in substantially the same language as the preceding witnesses for the defendants.

This witness was interrogated by , plaintiff's counsel, as to the patent fee paid to Captain Ericsson for the use of his propeller; to which defendants' counsel again objected, and excepted to the ruling of the court by which said inquiry was permitted; witness stated that he first saw an Ericsson propeller in 1839, which was brought out from Liverpool by Captain Stockton and placed in the Phœnix foundry, of which witness was then proprietor; I could make Emerson's wheel from his specification and drawings together, but should derive no benefit from his specification.

James I. Mapes next testified as follows: I am a consulting engineer; and am familiar with the specifications and drawings of machinery, having superintended the preparation of them for inventors and patentees; I have read John B. Emerson's specification; I could not delineate or construct from it either of the two copper models that have been produced as models of Emerson's and Ericsson's propeller, for these reasons: 1st, that the forms of the propelling surfaces are different; 2nd, no hoops are given; 3d, because spiral spokes are not given; 4th, because the number of spokes must be at least equal to the number of blades, which is not the case in Ericsson's propeller; both wheels will propel a boat; I know no other property which they have in common; (Emerson's drawing is produced to witness;) the drawing does not conform to the specification; I do not think the two together would enable any one to construct any wheel; the two are incompatible, the one with the other.

Cross examined.

I was a merchant five or six years; have been engaged in making sugar; I have never built a steam engine nor a wheel; I am not an operative; the paddles of Trott's wheels are planes; Smith's are spiral; the difference in result is in favor of the spiral plates, but the principle of action in each is the same; my occupation has been various of late years; have been much engaged in engineering and with machinery; the difference between Trott's propelling planes and Ericsson's is not material; the two produce the same results; the screw is a succession of

inclined planes—a continual inclined plane; there is a slight advantage in the spiral form; between Emerson's specifications and drawing there is an entire incompatibility.

Elias Harrison then testified as follows: I first saw Ericsson's propeller in operation in the year 1835, in London; it was in the fall of 1835, or might have been spring of 1836, that I first saw the Ericsson propeller.

William A. Cox then testified as follows: I am a mechanical engineer and draughtsman; the witness testified with regard to the descrepancies between Emerson's specification and drawing, and the impossibility of constructing a machine resembling Emerson's propeller from the specification, substantially to the same effect with Dunham, Stillman, and other witnesses for defendants.

Being cross examined, witness says: I am a partner of James I. Mapes; I never have been a practical mechanic; never concerned in the construction of propellers; I think I could construct a propeller.

David Kemp testified as follows: I am a practical mechanic; witness testified as to the descrepancies between Emerson's specification and drawing, and the impossibility of constructing a machine resembling Ericsson's propeller from said specification, substantially to the same effect with Dunham, and other witnesses for defendants.

Being cross examined. I have worked a machinery in the Phœnix foundry, but not since 1840.

James Winchell testified as follows: I am a workman in the employ of the defendants; I know the propeller of the Legate was hung before the 23d of March, 1844; to the best of my knowledge, between that time and the end of April, there was no propeller built in the Phœnix foundry; last Christmas nine years I went into the Phœnix foundry; propellers were made by the defendants for the Uncas, Seneca, Trumbull, Pilot, Phœnix, and Pioneer, (the three last very small,) the Preble, and Legare, and none others; I have no knowledge of any other prior to the first of May, 1844; the Uncas and Seneca were seven foot propellers; five or six were all about the same size; defendants made none to use, and used none; they merely made them for others.

Cross examined.

I could not say the tonnage of these boats; the Mohawk, Seneca, Trumbull, Preble, and Uncas were about 250 or 280 tons; the Pilot, Phœnix, and Pioneer were about 70 tons; the Legare I should say about 800; I fix the dates from the entries in the books of defendants showing when the work was done; the Legare is called "the cutter;" the book forms part of the case, and may be referred to by either party.

The defendants here rested.

The counsel for the plaintiff then called James P. Allaire, who testified as follows: I have been 48 years a mechanic, and am one of the proprietors of the Allaire works; I have examined Emerson's specification; I could make from it such a wheel as this, (Emerson's copper

model;) I should take a piece of metal a little longer than the propeller, (witness goes on to construct it in the language of the specification, and says that he should then use a rim or rims to brace it;) nothing is said about a rim or rims in the specifications, and nothing about bolts or nails, but I should know where to put a bolt, I hope so; if a wheel intended to operate under water, any mechanic would know that the arms ought to be spiral.

Cross examined.

Being told to make a spiral wheel, I should not consider the rim or spiral arms an invention. Any thing that turns is a wheel. Any thing may be a wheel without a rim. I never made a spiral propeller.

James Stone testified as follows: I am 58 years of age, and have been employed as a mechanic in various kinds of machinery. I remember Emerson's specifications and drawing, and I could make the wheel of Emerson from them.

Cross examined.

I never made a spiral propeller, or the model of one. I am a plumber by trade.

Samuel G. Ogden, jr., testified as follows: I paid Captain Ericsson's bill for the steam machinery and propeller of the Legare. It was $1,820 $\frac{6}{100}$ *dollars*, $900 of which counsel for defendants admitted to be Captain Emerson's fee for the propeller of the Legare. The bill is dated 24th May, 1844, and was paid by me on the first of June.

This evidence was objected to by defendants' counsel as irrelevant, but was admitted by the court; to which ruling defendants' counsel there and *there* excepted.

Plaintiff's counsel here rested.

Defendants' counsel then recalled James Winchell, who testified as follows: To the best of my knowledge, no other propeller than that in the Legare was in the course of making from the time the Legare propeller was turned out until the middle or last of April.

Being cross examined.

On the 28th day of February, 1844, I went to work on board of the Legare. This I got from the defendants' books. I can't tell when the Legare was launched. I became of age the 7th of July, and I think the Legare was launched about two months before. I could not tell to a day.

Barnabas H. Bartol being recalled, testified as follows: The cost of a pair of 7 foot propellers would be about $400, including materials and labor; the smaller one $250. On these prices the manufacturer's profit ought to be from 10 to 15 per cent.

The counsel for the defendants then prayed the court to instruct the jury as follows:

1st. That the claim of the plaintiff, as set forth in his specification annexed to his letters patent, embraces the entire spiral paddle wheel.

The claim is therefore too broad upon the face of it, and the letters patent are void upon this ground, and the defendants are entitled to a verdict

2d. That if the court should depart from the language of the patentee, in which he has made his claim, for the purpose of giving to that claim a limitation which may not be too broad, it could not clearly, or with any reasonable certainty, or without resorting to conjecture, be determined by the court what the claim was; and the patent is therefore void for ambiguity, and the defendants are entitled to a verdict.

3d. That the patent is void upon its face for this, that, purporting to be a patent for an improvement, and specifying that the invention is of an improved spiral paddle wheel, differing essentially from any which have been heretofore essayed, without pointing out in what the difference consists, or in any manner whatever indicating the improvement by distinguishing it from the previously essayed spiral wheels, it is wanting in an essential prerequisite—the validity of letters patent for an improvement.

4th. That the patent is void upon its face, for this, that it embraces several distinct and separate inventions as improvements in several distinct and independent machines, susceptible of independent operation, not necessarily connected with each other in producing the result aimed at in the invention, and the subject matter of separate and independent patents.

5th. That, inasmuch as it appears conclusively by the deposition of Arthur L. McIntyre, the officer in the Patent office of the United States who has the care and custody of the drawings therein filed, that on the 12th day of February, 1844, the plaintiff filed a drawing, sworn to by him as a correct delineation of his invention, which drawing had been on file the 5th day of May, 1841, when it was there deposited by the plaintiff unattested; that said drawing became a part of the record of the plaintiff's patent, and that the said record was then complete; and the rights and privileges of the plaintiff, under the act of Congress of March 3d, 1837, were exhausted by the filing of said attested drawing, and therefore said drawing was the one which (if any) should have been introduced in evidence as the recorded delineation of the invention, and the second drawing subsequently filed and introduced in evidence should be disregarded by the jury.

6th. Though, inasmuch as it appears conclusively by the deposition of Arthur L. McIntyre, as before stated, that on the 12th day of February, 1844, the plaintiff filed a drawing, sworn to by himself as a correct delineation of his invention, which drawing had been on file since the 5th day of May, 1841, when it was there deposited by the plaintiff, unattested, that said drawing became a part of the record of plaintiff's patent, and that as against these defendants who, by legal presumption, were notified of the nature and character of the invention of said first drawing, he is now estopped from asserting that the same is not a true delineation of his invention, either by the testimony of witnesses or by the introduction of a 2d and different drawing.

7th. That the rule of law which declares the drawings for patentee to be part of his patent, and that they may be referred to for the purpose of helping out the specification, should be limited to those cases in which the drawings are either annexed to or referred to in the specification; and that even in such case the drawings cannot be resorted to for the purpose of adding to, or in any manner enlarging, the claim as set forth in the specification.

8th. That if the 2d drawing, which has been exhibited in evidence, is to be regarded as a part of the plaintiff's patent, and to be referred to to help out the specification, there must be a conformity between them. If they are at substantially variance and incongruous, and inconsistent with each other, it is a fatal defect in the patent, which alone is sufficient to prevent the recovery of the plaintiff.

9th. That if, from the testimony, the jury believe that the placing of the paddles obliquely upon the rim of the wheel, sworn to by John S. Trott as having been made by him in 1818, as substantially the same in principle as placing them spirally upon said rim, the defendants are entitled to a verdict.

10th. That the plaintiff must satisfy the jury (to sustain the only judicial construction of which the patent admits) that he is the first and original inventor of the spiral form of the propelling float; and if from the evidence in relation to the patent and wheel of Benj'n M. Smith, in 1829—of Ebenezer Beard, in and of the spiral float used by John Stevens, in 1805—they believe that this spiral form was not new in the plaintiff, but was known and used before his patent, that upon this ground the defendants are entitled to a verdict.

11th. That if the jury believe, from the specification of the plaintiff and the testimony, that he designed to express his improvement to consist in the trough form given to the propelling plates by bending them along the centre, so that the sides of the plates shall be at right angles or nearly so to each other, and that this trough form thus produced previous to giving the plate the spiral curve longitudinally, is to be considered as of the essence of plaintiff's invention, that then the defendants have not infringed upon his rights, and are entitled to a verdict.

12th. That if the jury believe, from the specification and the testimony, that neither a cylindrical band nor the twisted spokes were described by the plaintiff as constituting a part of the paddle wheel by him patented, that the same cannot be added as a component part of his invention by their insertion in a drawing filed ten years after the issuing of his letters patent.

13th. That from the silence in the specification, both as to the hoop or cylindrical band and twisted spoke, notwithstanding their delineation in the drawing, the jury must infer one of two things, either that the plaintiff did not invent, and therefore did not describe them, or that they were (as his witness Allaire in substance testified,) not the subject matter of invention at the time at all, being old and well known parts of the machine described.

14th. That unless the jury believe from the testimony the plaintiff, before the issuing of his letters patent, actually reduced his alleged invention to practice, the patent is void, and the defendants are entitled to a verdict.

15th. That if, from the testimony, the jury believe that Captain Ericsson actually reduced the propelling wheel to practice, such as were constructed by the defendants, before the same were reduced to practice by the plaintiff, the defendants are entitled to a verdict.

16th. That the exclusive rights of a patentee are to make as well as to use, and vend to others to be used, and that the rule of damages as against the manufacturer who has invaded the exclusive right to make it, the profits which he has derived, or which the plaintiff might have derived from such making, because it is the sum which by his invasion he has prevented the patentee from obtaining.

17th. That if, from the evidence, the jury are satisfied that no propelling wheels were made by the defendants between the 27th of March, 1844, the date of the alleged completion of the record of the plaintiff's patent, under the act of March 3d, 1837, and the commencement of this suit in April following, that upon this ground the defendants are entitled to a verdict.

18th. That the invention of the *the* plaintiff as described in his specification, as illustrated by his drawing, cannot be regarded as a combition of the several parts of the wheel; as a combination the invention is not brought out in the specification or drawings, and such a view of the case is entirely inadmissible.

But the said circuit court did then and there refuse to instruct the said jury according to the prayers of the said defendants, and did then and there declare and deliver their opinion and charge to the said jury as follows, viz:

1. The court in charging the jury submitted to them as a question of fact whether the drawings made by Doctor Jones, in 1844, of the paddle wheel of the plaintiff were substantially in conformity with the drawings filed, and model deposited in the patent office in 1834; that if this fact was found in the affirmative it was not seriously disputed, but that the wheel of Ericsson was similar to one constructed from the specification and drawing of the plaintiff when taken together.

The court further charged, that if the jury found the above question in the negative, that it would become necessary for them to inquire whether the specification, without the aid of the drawing, was sufficient to enable a mechanic of ordinary skill to construct the plaintiff's wheel, such a one as could be constructed with the aid of it.

The court further, in charging the jury, submitted to them the question whether the plaintiff was the first and original inventor of the improvement, referring them to the evidence upon this branch of the case.

That the filing of imperfect drawing of his wheel in 1841 did not preclude the plaintiff from filing a corrected one in 1844, and that the drawing could be referred to in aid of the specification, though not an-